Planning, implementation and evaluation of antenatal weight management programmes

Planning, implementation and evaluation of antenatal weight management programmes: What are the key components? A mixed methods study

Author Names and Affiliations

Sarah Macauley PhD MSc BSc

School of Nursing / Institute of Nursing & Health Research,
Ulster University,
Belfast,
County Antrim,
Northern Ireland,
BT37 0QB
Email: sarah.macaulay@wales.nhs.uk
ORCID ID: 0000-0003-4527-8068

Wales Cancer Network
1st Floor, River House,
Bridge Court,
Cardiff
CF15 9SS
Wales
[**Present Address**]

Briege M. Lagan PhD MSc, BSc, RGN, RM [**Corresponding Author**]
School of Nursing / Institute of Nursing & Health Research,
Ulster University,
Belfast,
County Antrim,
Northern Ireland,
BT37 0QB
Email: bm.lagan@ulster.ac.uk
ORCID ID: 0000-0001-5536-394X
Tel: + 44(0)28 903 68318
Fax: + 44(0)28 903 68341

Karen Casson PhD MSc, BA
School of Nursing / Institute of Nursing & Health Research,
Ulster University,
Belfast,
County Antrim,
Northern Ireland,
BT37 0QB
Email: k.casson@ulster.ac.uk
ORCID ID: 0000-0002-6178-474

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The authors declare no conflict of interest.

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Abstract

Objective: To provide an understanding of the influential components required for the planning, delivery and evaluation of antenatal weight management programmes for women who are overweight or obese.

Design: Two phase sequential explanatory mixed methods design comprising of an online survey and one-to-one telephone interviews.

Setting and participants: All UK maternity services (n=168) and local government councils (n=417).

Findings: From the 378 responses, 49 maternity services and 28 local government councils reported having an antenatal weight management programme. Of the 62 responses that specified BMI as an inclusion criterion only two-fifths (40.3% *n*=25) adhered to the recommended threshold to include women with a BMI ≥30 kg/m^2. Although having a multi-disciplinary team was identified as fundamental when planning a programme, only 20.6% (*n*=14/68) of the programmes involved service users during the planning phase. How the programme was communicated to a woman was a key factor which determined whether she partook in the programme or not. Having administrative support and staff with expertise in data collection were essential when evaluating a programme. Staff having protected time was identified as important when planning, delivering and evaluating a programme. Three overarching themes were identified from the individual interviews (*n*=14) 'choices and decisions', 'demands and resources' and 'engagement and disengagement'.

Key conclusions:

National guidelines recommendations regarding service user involvement when planning programmes and the BMI threshold used for inclusion are not being met. In addition to having adequate time, personnel and finances, successful programmes are dependent on the confidence and communication skills of midwives to raise the issue of obesity with these women at the booking appointment. Without staff having the time and necessary knowledge and skills, evaluation, and hence demonstrating programme impact, will likely remain difficult. Organisational support is needed to release resources to plan, deliver and evaluate these programmes. Strategic communication strategies are needed to promote the programme to both women and staff within organisations. Future programmes need to

ensure there is engagement with service users from the planning of the programme through to evaluation.

Keywords: Pregnancy, obesity, weight management, programme planning, implementation, evaluation

Introduction

Overweight and obesity are major public health problems (World Health Organization 2016). For women that are pregnant, the same BMI categories for the general population are used; maternal overweight being defined as having a BMI between 25.0-29.9 kg/m^2 and maternal obesity having a BMI ≥30 kg/m^2 (CMACE and RCOG 2010; WHO 2016). Due to socioeconomic conditions and lifestyle factors, maternal overweight and obesity have dramatically increased internationally in the last two decades (Hruby and Hu 2015). Ten years ago, the prevalence of maternal overweight and obesity globally was reported as ranging from 1.8% to 25.3% across countries (Guelinckx et al. 2008). However, recently the prevalence has been reported to be higher in some countries e.g. 38% in Jordan (Al Nsour et al. 2013) and 6.5% to 50.7% in Africa (Onubi et al. 2016). In the UK, one in five pregnant women are classified as obese (The Health and Social Care Information Centre 2016).

It is well documented in the literature that maternal overweight and obesity can have a significant impact on the health of both the woman and her baby (Valsamakis et al. 2015). A woman who is overweight or obese while pregnant increases her risk of developing gestational diabetes and hypertension and has an increased risk of needing an instrumental or caesarean delivery (Marchi et al. 2015). For the fetus the chances of being macrosomic, or being born prematurely, and/or having a heart defect are also increased (Marchi et al. 2015; Kim et al. 2016; Knight et al. 2016). Statistics from the 2016 Confidential Enquiry into Maternal Deaths identified that one third (33%) of women in the UK who died during pregnancy or delivery between 2012–2014 were obese, and almost one fifth (18%) were overweight (Knight et al. 2016).

The antenatal period is an opportune time to tackle obesity and reduce the risks of associated complications as women have regular contact with health professionals and may be more motivated to make changes (Foresight 2007; Phelan 2010; Thangaratinam et al. 2012). Therefore, in an attempt to tackle the increasing prevalence and the health complications associated with maternal overweight and obesity, pregnancy specific guidelines and programmes have been developed and implemented globally (Rasmussen et al. 2009; CMACE and RCOG 2010; Health Canada 2010; NICE 2010; Australian

Government Department of Health 2013). As the safety of encouraging women who are overweight or obese to lose weight during pregnancy has not been substantiated (NICE 2010; Furber et al. 2013; Catalano et al. 2014), the focus of recommendations has been on weight management. Reviews conducted by Thangaratinam et al. (2012) and Dalrymple et al. (2018) identified that typical interventions have incorporated educational materials to promote a healthy balanced diet and physical activity guidelines, healthy eating plans, exercise programmes and/or behavioural counselling. Interventions based on diet and/or physical activity can minimise gestational weight gain and have a potential role in reducing adverse antenatal complications and pregnancy outcomes (Thangaratinam et al. 2012; Choi et al. 2013; Mc Giveron et al 2015).

Although evaluating the outcomes of any programme is essential, equally important is to appraise the processes that were used to plan and implement such programmes in an attempt to ensure that future approaches can be designed and delivered effectively (Department of Health, Social Services and Public Safety 2012). Of equal importance is to determine which core components contribute to a programme working or not working. Therefore, the aim of this study was to determine the core components that contribute to a programme working (or not) when planning, implementing and evaluating antenatal weight management programmes for women who are overweight or obese.

Methods

Following ethical approval from XXX University Institute of Nursing and Health Research Governance Filter Committee, a two-phase sequential explanatory mixed methods design was employed. Phase one involved using an online questionnaire to collect quantitative data to identify the activities and resources involved in planning, implementing and evaluating antenatal weight management programmes, and the barriers and facilitators encountered during these processes. To explain the findings from phase one in more depth, phase two consisted of one-to-one semi-structured telephone interviews with some of the participants who completed the questionnaire.

Sample and sampling

At the time of data collection, in total there were 168 maternity services and 417 local government councils identified across the four UK countries (Table 1).

Table 1. Distribution of UK maternity services and local government councils

Country	Maternity Services		Local Government Councils	
	***n*.**	**%**	***n*.**	**%**
England	142	84.5	352	84.4
Northern Ireland	5	3.0	11	2.6
Scotland	14	8.3	32	7.7
Wales	7	4.2	22	5.3
Total	168	100	417	100

Any weight management programmes for women who were overweight or obese during pregnancy, identified through midwifery forums and local government councils, and implemented from January 2011 to December 2016 were included. The rationale for choosing this timeframe (2011) was two-fold; national data on maternal obesity have only been collected since 2010; and it was also in 2010 that the Centre for Maternal and Child Enquiries (CMACE) report called for more effective programmes for maternal obesity. Due to the difficulty in accessing private sector programmes these were not included.

Phase one

Data collection instrument

Separate web-based questionnaires for maternity services and local government councils were utilised to account for differences in terminology, however, the content was kept similar in order to allow the two datasets to be merged for analysis. The questionnaires were structured to follow a programme planning process and based on a literature review of frameworks for evaluating health promotion programmes (e.g. Grossmeier et al. 2010). Section one of the questionnaire asked general questions such as the programme title and objectives. Section two focused on planning, section three on implementation and section four on programme evaluation.

A pilot study was conducted to test the face and construct validity of the questionnaire. Experts working in the field of midwifery (n=3) and local government councils (n=3), with experience of health promotion, were asked to review and complete the questionnaires. Minor amendments to the questionnaire were made based on feedback received.

Recruitment and data collection

To access information about maternity service programmes, an advert was placed on the Royal College of Midwives social media sites (Facebook and Twitter). The advert, together with an invitation email containing a link to a Participant Information Sheet (PIS), was also placed on a midwifery forum. The advert invited all Heads of Midwifery (HOM) in the UK or the person best placed within their organisation to complete the questionnaire.

All UK local government councils were initially contacted via email. Due to an initial low response rate, local government councils were also contacted by telephone. Once the appropriate person was reached, she/he was provided with the PIS and the link to the survey through email. Completion and submission of the questionnaire was taken as consent to participate.

Phase two

Sample and sampling

The sample was drawn from those who had participated in phase one and had expressed an interest in participating in a one-to-one interview by providing their contact details at the end of the questionnaire.

Data collection instrument

A semi-structured interview guide was developed from the analysis of the surveys, tailored according to individual survey responses and structured according to the programme planning process (as in phase one). Questions focused on the barriers and facilitators participants encountered when planning, implementing and evaluating programmes. To assist with further refinement of the interview questions, pilot interviews were undertaken with midwives within the university who had knowledge of programme planning.

Data collection

Potential participants were contacted via email and sent a PIS and consent form. Once the participant returned the consent via email the researcher arranged a time to conduct the interview. Although given the option to have the interview conducted by interactive email, telephone or SKYPE, all participants selected a telephone interview.

Data analysis

Data from the online surveys were exported directly into SPSS Version 23 for analysis. Descriptive statistics were used to summarise the characteristics of the programmes i.e. different components of the programmes.

The interview recordings were transcribed verbatim and the data transferred into the qualitative computer software package NVivo Version 10 for data management. The framework analytic approach articulated by Ritchie and Spencer (1994) was used to guide the analysis of the data from the interviews. Initial coding of the data was undertaken by the researcher (SM). The themes and codes were then crosschecked by members of the research team (BML; KC). Any debates in the codes and themes were discussed by all three researchers until a consensus was reached.

Findings

Phase one: Online survey

Responses were received from 74/168 (44.0%) maternity services and 304/417 (72.9%) local government councils. At the time of the survey, 25 (33.8%) of those who responded on behalf of maternity services indicated that an antenatal weight management programme for women who were overweight or obese had not been implemented within their workplace. Of those who completed the survey on behalf of a maternity service, two-thirds (*n*=49, 66.2%) provided data about an antenatal weight management programme. Of the local government councils who identified having a remit for delivering weight management programmes (*n*=170) and completed the survey, 28 (16.5%) provided data about a programme (Table 2).

Table 2. UK antenatal weight management programmes

Country (n= number in sampling frame)	**Total available for sampling**		**Responses split by Maternity Services and Local Government Councils**				**Number of Programmes Identified**			
	Maternity Services	Local Government Councils	Maternity Services		Local Government Councils		Maternity Services		Local Government Councils	
	n.	*n.*	*n.*	*%*	*n.*	*%*	*n*.	%	*n*.	%
England (*n*=494)	142	352	57	40	253	72	34	11	26	8.4
Northern Ireland (*n*=16)	5	11	5	100	7	64	5	42	0	0
Scotland (*n*=46)	14	32	9	64	23	72	7	22	1	3.1
Wales (*n*=29)	7	22	3	43	21	95	3	13	1	4.3
UK (*n*=585)	168	417	74	44	304	72	49	13	28	7.4

Although there were 77 questionnaires that contained data about individual programmes, missing responses for individual questions resulted in different denominators across variables.

Characteristics of identified programmes

At the time of the survey, the majority of programmes were still running (*n*=60, 77.9%) with just over half implemented after January 2011 (*n*=41, 53.2%) and 19 (24.7%) programmes implemented prior to 2011. One in five programmes (*n*=16, 20.8%) were implemented after January 2011 but were no longer running at the time of the survey.

The overall aim of the identified programmes varied. Analysis of the 44 (57%) responses which provided detail about the purpose of their programmes revealed managing gestational weight gain (*n*=14, 31.8%) was the most frequently cited aim. Other aims of programmes were to support women with a high BMI (*n*=13, 29.5%); to support women to make healthy lifestyle choices (*n*=7, 15.9%), and to improve the health of women, their baby or their family (*n*=4, 9.09%).

Most respondents who reported on programme components used multiple elements (*n*=51, 91.1%) with eight in ten programmes using both healthy eating and physical activity

discussion sessions (group or one-to-one) (*n*=41, 80.4%). Other programmes had additional components such as written information on healthy lifestyle (*n*=30, 58.8%) or written information on how to manage gestational weight gain (*n*=28, 54.9%).

Components of the planning phase

In relation to the planning phase of programmes, half of those who provided data (*n*=34/68) about personnel involved indicated that a multidisciplinary planning approach was used. Midwives (*n*=61, 89.7%) were the health professional that were most frequently cited as being involved when planning a programme, with the most frequently reported non-health professional being fitness trainers (*n*=18, 26.5%) (Table 3).

Table 3: Components of the planning phase

Component	*n*.
Personnel involved (n=68)	
Midwives	61
Dietitians	45
Obstetricians	21
Fitness trainers	18
Service users	14
Researchers	12
Data analysts	11
Physiotherapists	11
Health visitors	11
Psychologists	8
General Practitioners	8
Anaesthetists	6
Clerical assistants	4
Nurses	2
Pharmacists	2
Affiliated organisations (n=66)	
Statutory public health/ health promotion agency	51
Academic institution	11
Other organisations[a]	7
Community-based organisation	5
Funding sources (n=64)	
Statutory public health/ health promotion agency	37
Local government council	19
Other funding source [b]	5
Academic research funding	3
Private funder	2
Fee-for-service	1
Guidelines referred to during planning (n=76)	
NICE (2010)	63
CMACE/RCOG (2010)	52
Other guidelines[c]	9

NICE – National Institute for Health and Care Excellence; RCOG – Royal College of Obstetricians and Gynaecologists; CMACE – Centre for Maternal and Child Enquiries

[a] Private company (*n*=4), Professional body (*n*=2), Leisure centre (*n*=1)

[b] Charity (*n*=3), Lottery (*n*=1), Private business (*n*=1)

[c] Institute of Medicine Guidelines (*n*=4), Medical Research Council (MRC) Guidance: *Developing and evaluating complex interventions* (*n*=1), Slimming World Guidelines (*n*=1), Royal College Midwives (RCM) Guidelines (*n*=1), NICE Behaviour Change (2007) (*n*=1), Standard Evaluation Framework (NOO 2009) (*n*=1)

Many of the programmes (*n*=66/77, 85.7%) had an affiliation with at least one other organisation. Of the 64 who provided data on funding sources for programmes, almost two-thirds (*n*=24/38, 63.2%) of maternity services and half (*n*=13/26, 50.0%) of the local government councils cited funding from a statutory public health/health promotion agency. Six (15.8%) of the maternity service programmes were funded by local government councils.

Almost a tenth (*n*=7, 9.2%) of respondents reported that neither the NICE (2010) nor RCOG/CMACE (2010) guidelines were referred to during the planning phase. Of those that referred to the NICE (2010) guidelines and indicated whether these were considered to be a barrier or facilitator (*n*=50), the majority (*n*=42, 84.0%) reported that they assisted the planning of the programme whereas five (10%) stated the guidelines impeded the process. The remaining three (6%) stated the guidelines were both a barrier and facilitator during the planning phase.

Other reported factors that facilitated the planning phase were the use of a health promotion framework (*n*=40/49, 81.6%) and having access to facilities to plan the programme (*n*=40/55, 72.7%). The lack of administrative support (*n*=29/54, 53.7%), and human resources (*n*=18/42, 42.9%) and staff not having enough time to plan (*n*=27/55, 49.1%) were the main factors that hindered the planning process (Supplementary Material 1).

Components of the implementation phase

A woman's BMI was the main deciding criterion as to whether a woman was invited onto the programme (*n*=62/66, 93.9%) (Table 4). Other deciding factors included gestational age (*n*=12, 18.2%) and living within the catchment area (*n*=16, 24.2%) where the programme was being implemented.

Table 4: Components of the implementation phase

Components	*n.*	%
Inclusion criteria: BMI category (kg/m^2) (n=66)		
BMI ≥25	8	12.1
BMI ≥30	25	37.9
BMI ≥35	8	12.1
BMI ≥40	8	12.1
Other BMI categories [a]	13	19.7
BMI not specified	4	6.06
Staff training to deliver programme (n=71)		
Yes	44	62.0
Not sure	14	19.7
No	13	18.3
Awareness sessions to inform staff of the programme (n=69)		
Yes	50	72.5
No	13	18.8
Not sure	6	8.70
Methods used to promote programme to women (n=69)		
Health professionals	68	98.6
Leaflets	46	66.7
Poster advertisements	33	47.8
Organisation website	17	24.6
Social media	10	14.5
Other methods [b]	3	4.30

[a] Specified BMIs had to be between 25.0-29.9 kg/m^2 (*n*=2), 25.0-39.9 kg/m^2 (*n*=2), 30.0-34.9 kg/m^2 (n=4), 35.0-39.9 kg/m^2 (*n*=4), 30.0-39.9 kg/m^2 (*n*=1).
[b] Local newspaper (*n*=2), telephone service (*n*=1)

Almost two-thirds (*n*=44/71, 62.0%) of the respondents indicated that staff involved in delivering the programme had received some form of training. For those who specifically identified the personnel who had received the training (54.5%, *n*=24/44), midwives (*n*=15, 62.5%) were the most frequently reported. Of the 30 who stipulated the type of training received, motivational interviewing (MI) (*n*=7, 23.3%) and behavioural change techniques (*n*=4, 13.3%) were the most cited. Of the 35 respondents who reported that staff received specific training and answered the questions about whether the training facilitated or hindered implementation, two-thirds (*n*=23, 65.7%) stated that training assisted delivery of the programme while six respondents (17.1%) reported the training hindered the process.

For those (*n*=50/69, 72.5%) who reported that their organisation provided awareness sessions to inform staff of the programme, almost two-thirds (*n*=21/34, 61.8%) stated this helped with the implementation process. Different strategies were used to promote awareness about the programme (Table 4). Midwives (*n*=67, 97.1%) were the main health professional responsible for promoting the programme, followed by General Practitioners (*n*=18, 26.5%).

Having staff with experience in programme delivery (*n*=32/50, 64.0%) and having financial support (*n*=29/47, 61.7%) were identified as key to aiding programme delivery. However, just over half of the respondents (*n*=28/51, 54.9%) stated staff not having protected time to deliver the programme and the lack of administrative support (*n*=22/50, 44.0%) were key barriers to the implementation process (Supplementary Material 2).

Components of the evaluation phase

Over three-quarters of the respondents (*n*=59, 76.6%) stated evaluation was considered as part of the planning process. However, less than half (*n*=25, 43.9%) had completed any form of evaluation at the time this survey was conducted. Of the 24 who completed the question about the type of evaluations that were conducted less than half (*n*=11, 45.8%) reported that more than one type of evaluation was completed. Of these, the majority (*n*=10, 90.9%) conducted all three types of evaluation i.e. process, impact and outcome evaluations (Table 5).

Table 5: Components of the evaluation phase

Components	*n*.	%
Evaluation considered as part of the planning process (n=77)		
Yes	59	76.6
No	5	6.50
Not sure	13	16.9
Completed an evaluation (n=57)		
Yes	25	43.9
Internal evaluation	16	64.0
External evaluation	6	24.0
Not sure if internal or external	3	12.0
No	19	33.3
Not sure if evaluation completed	13	22.8
Types of evaluations conducted (n=24)		
Outcome evaluation	20	83.3
Impact evaluation	17	70.8
Process evaluation	14	58.3
Data collection methods (n=46)[a]		
Assessment of gestational weight gain	25	54.3
Questionnaires completed by women	24	52.2
Audit reports	13	28.3
Interviews with women	10	21.7
Diaries kept by women	8	17.4
Adverse incident reports	7	15.2
Focus groups with women	7	15.2
Questionnaires completed by programme implementers	6	13.0
Focus groups with implementers	3	6.50
Interviews with implementers	3	6.50

[a] Some respondents provided information on data collection methods but at the time of the survey had not completed a formal evaluation

Having staff with expertise (*n*=12/14, 85.7%) and knowledge in programme evaluation (*n*=12/15, 80.0%) and the collaboration of stakeholders (*n*=9/12, 75.0%) were the main factors identified as facilitating the evaluation of programmes. The main factor which hindered evaluations was the lack of staff time (*n*=9/18, 50.0%). Other factors that made evaluation challenging included: competing priorities between stakeholders (*n*=3/11, 27.3%), lack of funding (*n*=3/12, 25.0%) and lack of staff training (*n*=3/12, 25.0%) (Supplementary Material 3).

The most common measures used to evaluate outcomes and impact of the programme, regardless if a formal evaluation had been completed or not, were participation rates (*n*=45/48, 93.8%), completion rates (*n*=44/49, 89.8%) and the number of women whose BMI decreased from participating in the programme (*n*=26/42, 61.9%). The majority used the findings from their evaluations to inform the development of future programmes (*n*=12/14, 85.7%) and/or evidence for sustaining the programme (*n*=9/14, 64.3 %) (Supplementary Material 4).

Comparison between maternity services and local government councils

Overall, the responses from maternity services and local government councils were generally similar regarding components of their programmes. For example, approximately three-fifths of maternity services (*n*=29, 64.4%) and local councils (*n*=15, 57.7%) offered staff training to deliver the programme. There were also similarities in relation to the percentage reporting evaluation was considered in the planning process (maternity services *n*=39, 79.6% vs local council *n*=20, 71.4%). In relation to differences, local government councils more frequently reported using a process evaluation (*n*=8, 80.0% vs maternity services *n*=6, 42.9%) and exercise programmes (local council *n*=12, 63.2% vs maternity services *n*=9, 24.3%) (Supplementary material 5).

Phase two: One-to-one interviews

Out of the 77 survey respondents, fourteen agreed to be interviewed. All four UK countries were represented in the interviews. The disciplines and roles in the programme differed between maternity services (M1-M10) and local government councils (C1-C4) (Table 6). Half of those interviewed were midwives. Although three of the interviewees were not actively involved in the planning, implementation or evaluation of a programme they were the persons (line managers) for those who did and reported to.

Table 6: Overview of interviewees

Participant ID:	Country	Interviewee Discipline	Role in Programme			
			Planning	*Implementation*	*Evaluation*	*Other*
M1	England	Midwife				✓
M2	England	Midwife	✓	✓	✓	
M3[a]	Scotland	Trainee Health Psychologist Advanced Health Promotion Practitioner	✓	✓	✓	
M4	Northern Ireland	Midwife	✓			
M5	England	Researcher	✓		✓	
M6	England	Midwife	✓	✓	✓	
M7	England	Midwife	✓			
M8	Scotland	Health Improvement Lead	✓			
M9	Wales	Midwife	✓			
M10	England	Midwife		✓		
C1	England	Health Improvement Practitioner Specialist				✓
C2	England	Public Health Programmes Manager	✓			
C3	England	Personal Trainer		✓		
C4	England	Senior Public Health Manager				✓

[a] Two interviewed
M = Maternity service
C = Local government council

Themes

Analysis of the interviews identified three overarching themes; "*choices and decisions*", "*demands and resources*" and "*engagement and disengagement*". These, with their associated sub-themes, will now be discussed.

Theme one: Choices and decisions

Use of accredited guidelines

Several participants highlighted the benefits of having guidelines (CMACE and RCOG 2010; NICE 2010; Scottish Intercollegiate Guidelines Network 2010) when planning programmes. Such guidelines provided the evidence base for deciding the best approach to take:

> "*Part of it was we didn't want to reinvent the wheel. We wanted to look at what else was going on around the country. So, we looked at what NICE was saying about weight management, what they recommended...*" (M9)

> "*I think they are really useful* [national guidelines] *because it saves us having to go through all the research and having to make decisions about what is the best thing to do. So that really helps us hugely because we all agree, well these are the guidelines, this is what we use*." (C2)

Although not recommended by NICE (2010) the decision by some programme teams to use the IOM guidelines, was based on women wanting to maintain/achieve a target weight.

> "…*women are saying they want to be weighed and they want to have some sort of limit of how much to gain each month as a rough guide…we basically had the Institute of Medicine guidance…and that's been a bit tricky because obviously NICE hasn't really gone down that route..."* (M2)

Selecting the target population

Although national guidelines recommend targeting all women with a BMI ≥30 kg/m^2, due to a lack of resources this was not always feasible. Participants acknowledged that they were unable to adhere to such recommendations and had to focus on women with higher BMIs because of inadequate staffing levels and lack of funding:

> "*…wanted it to be over BMI 35 kg/m^2 because we could see there were a large number of women in this group who were in the obese category, who needed to be tackled. Ideally it would have been over 30 kg/m^2 but that would have taken much more in staffing levels to do. So, we found a middle ground at BMI 35 kg/m^2...*" (M9)

> "*We knew from national guidance that a BMI of 30* kg/m^2 *and above we needed to take some action. But the commissioning situation was about money and how much more it would cost to go down to BMIs of 30* kg/m^2 *or above*." (M7 – target BMI ≥35 kg/m^2)

There was one local government council who, although acknowledging NICE recommendations, felt it was also important to not only target women who were classified as obese but also those who were overweight [target BMI ≥25 kg/m^2]:

> "*I know that ordinarily it is BMI 30 kg/m^2, isn't it? But we actually thought it was really important that we supported women who were overweight as well as obese. Because actually we do see that the public health benefits of actually somebody thinking about their weight long term is really, really important*…" (C4-Commissioner)

Theme two: Demands and resources

Identifying human resources

During the interviews, there was consensus that a significant challenge facing programme planners and implementers was the availability of human resources. Competing priorities within the workplace often meant that clinical duties took priority over delivering the programme. In some situations, where staff were taken out of their substantive position to deliver the programme, there were problems in getting replacement staff to cover staffing deficits:

> "…*it was a case of every Saturday morning to try to put a midwife in there was a real issue…We've had historical issues with staffing and obviously women on the labour ward, for example, obviously take priority over attending a group that isn't necessarily seen as acute*." (M1)

> "…*You know if we take somebody to do a project, we have to backfill their work. So, I was lucky enough that the girl that did mine took extra hours because she worked part-time but if someone was taken out of their full-time job then that would have to be backfilled so that takes time. It's very hard to get temporary staff at the minute*." (M4)

It was recognised by some that not every project or programme team is fortunate to have access to a person who had both the knowledge and expertise on how to conduct an evaluation of a programme:

> "…*you know the ability for someone to actually do that evaluation. I guess not every maternity unit around the country would necessarily have either a consultant midwife or public health lead, somebody that can actually lead and complete that evaluation…" (M2)*

Protected time

There was also consensus among participants that staff needed to be given time to plan, deliver and evaluate programmes. This included time to attend planning meetings, to promote the programme during booking appointments and for data collection.

> "*…I think it is a time thing, I think because everybody is working to full capacity there isn't sort of any free time for people to get into strategy groups together to look at things, that is one of the difficult things."* (M6)

> "…*the time that the midwife has at the first booking is one hour…It's so limited so they feel restricted and restrained and concerned about the time allocated to have to raise the issue of obesity…It's a challenge for the midwife to raise this issue and have a meaningful conversation during the booking time because it does take time*." (M8)

> "…*we don't have a lot of time for data collection and for research unfortunately. So that that has been a challenge in the programme as well…"* (M10)

Some participants discussed the importance of support for programme planning and evaluation. Being flexible with planning meetings also enabled the planning process:

> "*It was difficult to try and negotiate the time away from clinical duties to set up this programme…we had a very, very supportive manager and head of midwifery so eventually we got the time that we needed*…" (M10)

> "*I think it's again to not underestimate the amount of administration resource you are going to need in terms of collating this data..."* (M1)

> *"…we had to be flexible and have meetings at 8am before they would start and they would be paid a bit extra or they could be flexible with their time...*" (C2)

Theme three: Engagement and disengagement

Intra- and inter-organisational collaborative relationships

A few interviewees stated that the nature of some partnerships meant that some programmes were not always specifically designed with an antenatal weight management focus:

> "*It is a general population* [programme] *so there isn't any pregnancy specific information that is given. It was around diet relating to* [private organisations] *programme*." (M1 – partnership between maternity services and private organisation)

> "*They [*pregnant women*] are not excluded. The only criteria we had was a BMI of 25 kg/m^2 plus…it would just run the same* [for pregnant women] *as what our normal course* [programme] *did*." (C3 – partnership between maternity services and local government council)

The necessity of engaging with different stakeholders was highlighted when planning a programme. Participants discussed how a multi-disciplinary approach was needed:

> "*I think it has to be more joint work really…I think sometimes you need to have more people around the table to talk about how you want something to work. It is not a thing that you can go alone…you do need the organisation behind you and you do need the obstetricians and you do need commissioners and dietitians to get together to have a multi-disciplinary programme."* (M7)

Although there were attempts to achieve a multi-disciplinary approach, there was a consensus among those interviewed that often obstetricians supported the programme by referring women, however, their engagement during the planning and implementation phases proved challenging.

> "*Although they* [obstetricians] *were supportive, from a point of view of referring the women to us, they didn't actually get involved in delivering the course* [programme] *at all…we wanted them to deliver that session* [risks of obesity during pregnancy] *but we couldn't negotiate that with them at all*." (M10 – Midwife)

Service user participation

Several interviewees acknowledged the importance of service user involvement, however, in some cases engaging with women in the planning phase was overlooked.

> "*This was one of our biggest flaws when we were planning the programme. We didn't ask the women what they wanted, and we acknowledged that afterwards. So, we didn't use forums that we could possibly have used. We have a maternity liaison committee which is where women and midwives and professionals come together once every three or four months and we failed to use that and that was a real oversight on our part...*" (M10)

As well as involving women in the planning phase, it was also maintained that they also needed to be part of the evaluation:

> "…*I think if we were to do it again you know one of the things we would be very keen to do would be to involve more service users I think that's just a more accepted way of planning these kinds of things now. Having service users more from the start and within the evaluation as well*…" (M5)

It was identified that a variety of factors can impede a woman who is obese from being able to attend an antenatal weight management programme:

> "*We found … they are much more likely to have more time to spend at hospital appointments. So, they don't want extra time off work if they can help it…obviously in today's society it is difficult to get time off work, so women cite that as a reason why they wouldn't come or that they had come and not been able to keep coming to the classes."* (M7)

The value of communication

When discussing the referral process, several participants, irrespective if the programme was viewed as successful or not, reported difficulties in relation to the communication between health professionals and women. A few mentioned how some health professionals (i.e. midwives) were uncomfortable with raising the topic of obesity with women who were obese and consequently did not promote the programme. For those midwives who did promote the programme, on some occasions the manner in how this was done resulted in some women declining the referral:

> "…*when I did the evaluation, it was the case if you had the same midwives that would refer women, it was the same midwives that would not refer women… midwives do not feel comfortable having that conversation with women about their BMI and that is an issue with having these conversations*." (M1)

> "…*A lot of women declined the service purely because it wasn't well explained* [by community and hospital midwives] *to them what the service was, why they were being offered it and what the potential benefits of that service would be*." (M5)

> "*I think she* [programme implementer] *wasn't always comfortable* [engaging in a conversation about obesity] *and it's a massive hurdle. But I suppose one way that we've got around that is by offering her support with the motivational interviewing coaching where she comes, and she gets feedback from* [coach] *about how she is getting on. I think that has helped and we have certainly seen a huge difference in her, so I think that was another kind of thing that we had to get around actually making people empowered enough to have that conversation with women*." (M3)

Regarding discussions on how to improve future implementation processes some mentioned the importance of providing staff with the knowledge and skills to enable them to broach the subject of obesity and promote the programme:

> "*I think you do need to make sure that all the midwives know about the programme, because that is where you get the referrals…So it was making sure that it was regularly mentioned at midwifery meetings. Making sure that people understood how they refer people, making it easy for them to do because they are very busy*." (C2)

Discussion

Although pregnancy has been identified as an opportune time to initiate change in health behaviours, (Phelan 2010; Thangaratinam et al. 2012) this study has identified that despite national recommendations not all maternity services in the UK who responded to the survey provided an antenatal weight management programme. Furthermore, while such guidelines

focus on women with a BMI ≥30 kg/m^2 for inclusion in an antenatal weight management programme, this study found that this was not always feasible. Due to limited human and/or financial resources interviewees described how it was not possible to include all women with a BMI ≥30 kg/m^2. Therefore, when planning programmes that would be manageable in terms of numbers and available resources, the criteria used for many was including only women within the higher BMI classes (BMI ≥35 kg/m^2; BMI ≥40 kg/m^2) and therefore, women who were classified as obese (BMI ≥30 kg/m2) and overweight were excluded. Schmied and colleagues (2011) also found similar principles were used in relation to referral care pathways for women who were overweight/obese and needed antenatal anaesthetic reviews and specialist services such as dietetics.

Several UK accredited guidelines (NICE 2007; 2010; 2014) recommend that commissioners and providers need to work with service users to plan, implement and evaluate tailored behaviour change programmes. Furthermore, service user involvement has been identified in the literature as fundamental to effective service and programme development (Blunt 2014; Omeni et al. 2014). However, this study has identified that only a minority of the programmes involved service users during the planning phase. Findings also identified that sometimes service user engagement was not considered until after a programme had been implemented. Some acknowledged that this was a "*real oversight*" on the part of the project team and that in future, to deliver successful programmes that are tailored and flexible to women's needs, they needed to include service users in the planning and evaluation phases. Likewise, Heslehurst and colleagues (2013) also identified the importance of including women's perspectives in the development of antenatal weight management services.

The NICE (2010) and RCOG (2018) guidelines also specify that a range of health professionals should be involved in the care of women with a BMI ≥30 kg/m^2 including midwives, dietitians and obstetricians. This study identified that, although programmes were multidisciplinary with a range of different health and non-health professionals collaborating in different phases of the programme, often obstetricians were involved in the referral process and "*happy to refer women*" but had limited engagement in the planning phase. By including or excluding specialist expertise and knowledge from even one specific discipline could potentially mean the difference between the effectiveness, acceptability and safety of a programme and improving the short and long-term outcomes for a mother and her baby.

There have been consistent recommendations (NICE 2010; Public Health Agency of Canada and the Canadian Institute for Health Information 2011; CDC 2015; NICE 2016) that to

address the public health issue of obesity in pregnancy, multifaceted partnerships are required that involve health service personnel, commissioners of services, managers and local government council leisure centres. Many of the programmes identified in this study were affiliated with at least one other organisation.

Although the findings provided evidence of collaborative working between local government councils, maternity services and/or commercial weight management organisations, during the planning and the implementation of programmes, this did not always mean that programmes were specifically designed for women who were pregnant. While it could be argued that having generic adult weight management programmes that pregnant women could also avail of made efficient use of available resources and offered the opportunity for prolonged engagement, potentially decreasing the risk of interpregnancy weight gain (Brindal 2017; Lynes et al. 2017), currently there is lack of evidence to determine if such programmes are safe and/or effective, or even acceptable to pregnant women. As alluded to by Proctor and Campbell (2014) and others, the needs of pregnant women are different to the non-pregnant population i.e. there are certain exercises pregnant women need to avoid and their nutritional requirements for pregnancy are different (American Dietetic Association 2008; British Dietetic Association 2016).

Several studies (Knight and Wyatt 2010; Lee et al. 2012a; Heslehurst et al. 2013; Olander and Atkinson 2014) have previously reported poor uptake and attendance rates for antenatal weight management programmes. Like other studies (Knight and Wyatt 2010; Leslie et al. 2013; Olander and Atkinson 2014) there was the perception from those interviewed in this study that work commitments, childcare and numerous hospital appointments often took precedence and made it difficult for women to attend programmes. While similar challenges have been reported by pregnant women regarding weight management programmes or adoption of health promoting behaviours during pregnancy (Harrison et al. 2018; Kazemi et al. 2018), it is important to recognise in this study that these were the views of the interviewees and not women themselves.

A key implementation factor that had an impact on uptake and attendance at programmes was the process of referral. While approaches to behavioural change such as Making Every Contact Count (MECC) (Health Education England 2017) which states that all health professionals should "*use every opportunity to promote health and wellbeing*" is not intended to add to the already busy workloads of health professionals, many in this study felt raising the issue of obesity with a woman did just that. In line with previous studies (Tod 2003; Lumley et al. 2009; Lee et al. 2012b; Foster and Hirst 2014), this study highlighted that, due

to lack of time and human resources, health professionals often had to make decisions about what was important to discuss during booking appointments and, as a consequence, addressing obesity and/or a discussion of the programme did not always occur. When health professionals did discuss obesity or refer women, some interviewees reported that one of the reasons women did not engage with the programme was due to the way a midwife promoted the programme. This is an issue which was previously identified by Heslehurst et al. (2017) when midwives were asked to refer women who were obese to dietetic services.

This highlights the importance for programme planners and implementers to ensure the World Health Organization's six principles for effective communication are at the core of its communication activities and are reflected not only in how they promote the programme but also how they engage women to partake in activities (WHO 2017). It is also important to consider how the programme is promoted to health professionals (Green et al. 2015). Previous studies have described how health professionals lack the necessary skills and expertise to communicate effectively with women regarding weight (Brown et al. 2003; Schmied et al. 2011; Lee et al. 2012b; Heslehurst et al. 2013). This study supports the opinion that when health professionals had adequate knowledge of the programme or training to engage in a conversation about obesity, this enabled effective communication with women. Heslehurst et al (2017) also discovered in their study that positive interactions between women and midwives meant a woman was more likely to engage with a weight management programme. Crossland et al (2015) and others have also identified the use of incentives to encourage behaviour change have been shown to boost engagement rates in other types of pregnancy related public health initiatives.

In addition to lack of evaluation skills, similar to the planning and implementation phases, inadequate time was also a key factor in the evaluation of programmes. While NICE (2007) guidelines recommend that adequate time should be dedicated for evaluation, approximately half of respondents who completed an evaluation reported that this did not occur. Similar to previous literature (Schneider et al. 2016), this was often due to competing priorities for staff.

This study had several strengths. To the best of our knowledge this is the first study that has provided a national overview of antenatal weight management programmes in the UK. Collecting information on the programmes using an online questionnaire, and one-to-one interviews, and using a sequential explanatory mixed methods approach has provided complementary data that have helped explain findings across datasets. The response rate (n=77/168, 46.0%) for the survey sent to UK maternity services was akin to that of other surveys which had a similar sampling frame (46.0%-68.0%) (Bick et al. 2014; RCM 2015).

Like any research project this study had several limitations. While efforts were made to ensure a representative sample was achieved, under-representation of programmes within England may limit the generalisability of the research findings. Due to the nature of complex health promotion programmes, it was impossible to examine all components and how they influenced whether the programmes worked or not (Pawson and Tilly 1997). A further limitation was that not all the interviewees had knowledge of all aspects of the planning, implementation and evaluation phases. Therefore, a complete picture of individual programmes was difficult to ascertain from those who were not directly involved. Since the survey may have been completed by someone who was not actively involved in the planning and implementation of the programme, there is a possibility of some social desirability bias (van de Mortel 2008).

Conclusions and recommendations

While it is positive that some maternity services and local government councils have implemented an antenatal weight management programme, it is concerning that not all have. Furthermore, of those who had implemented a programme, not all were able to set their inclusion criteria to adhere to recommended national and international guidelines. Significant human and financial resource challenges persist, therefore, in order for maternity services and local government councils to meet recommended guidelines, organisational support is needed to release resources to effectively plan, deliver and evaluate these programmes.

Core planning components were collaborative partnerships and having a multi-disciplinary team involving various health professionals and service users. However, this required flexibility and protected time for relevant stakeholders to attend strategic meetings. A core implementation component was the referral process. A significant factor that determined whether women accepted the referral and attended the programme was how the programme was promoted to women. Therefore, health professionals need the opportunity to learn how to maximise their time within routine antenatal care so they can have a brief discussion with women in a non-judgemental, caring and sensitive manner that empowers them to recognise the well-being value for both themselves and their baby as an incentive to attend an antenatal weight management programme.

To also strengthen the ongoing quality of antenatal weight management programmes and improve the outcomes for both women and their baby, evaluation should be incorporated

into all stages of programme design. This requires that staff are also given enough time, support and expertise for data collection.

The findings from this study have provided a basis for other studies. Although partnerships for programmes were developed with a variety of organisations, further research is needed to determine if weight management programmes that are not specifically designed for pregnancy are safe, effective and acceptable for pregnant women. Also, further investigation is needed to identify and prioritise what are the training needs for staff who are involved in the planning, implementation and evaluation of such programmes.

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